tubers is a fair index of the comparative intensity of respiration in the tissues. The data from both plant and animal tissues available at the present seem to justify the general indication that catalase action is invariably correlated with the oxidative processes involved in respiration."—WM. CROCKER.

**Respiration of stored wheat.**—BAILEY and GURJAR[18] have done an excellent piece of work on the respiration of stored wheat. Significant literature is well presented and related to the work in hand, and the methods used in the work are clean cut and exact. The contribution has a very important application in the shipping and storage of grains. They worked with moisture contents ranging from 12 to 18 per cent, such as appear in the practical handling of grains. The following are the more important results.

Respiration gradually and fairly uniformly rises with moisture content up to 14.5 per cent in case of plump spring wheat. With the rise of moisture above this percentage the respiration is markedly accelerated. The soft starchy wheats respire more rapidly than the hard vitreous wheats containing the same percentage of moisture. With more than 14 per cent moisture shriveled wheat respires 2 to 3 times as fast as plump wheat of the same water content, due to a larger percentage of embryo in the shriveled grains; with less than 14 per cent moisture there is little difference.

Freshly dampened wheat respires more slowly than wheat of the same water content that has been dampened for a long time or that has been naturally dampened. The difference is noticeable at 13 per cent moisture, and rises as the moisture rises. Wheat stored at room temperature respires more rapidly than that of the same moisture content at lower out-door temperatures. Unsoundness of wheat caused by the freezing of unripe plants increases respiration. This is attributed to the accumulation of glucose in the frosted grains. Increased temperature increases the respiration up to 55° C. When seeds are stored in closed chambers and the respiration taken by 4-day periods, the rate is highest for the first period and diminishes materially in successive periods as the carbon dioxide content rises. The respiration is also reduced in an oxygen free atmosphere, the ratio to that occurring in a normal atmosphere being about 1:2.5.

Many will think the author's evidence for their viscosity conception of limited respiration is insufficient. They will also question whether the amount of glucose present limits respiration when low moisture has already run respiration to so low an ebb.—WM. CROCKER.

**Relation of host and parasite among fungi.**—An excellent service has been rendered by REED[19] in bringing together the extensive and scattered data regarding the susceptibility of more or less related hosts to physiological strains

[18] BAILEY, C. H., and GURJAR, A. M., Respiration of stored wheat. Jour. Agric. Research 12:685–713. 1918.

[19] REED, GEORGE M., Physiological specialization of parasitic fungi. Mem. Brooklyn Bot. Gard. 1:348–409. 1918.

among various fungi. Some 68 species of fungi, the majority of them belonging to the Uredinales, have been reported to show such specialization. The first known and best studied species is *Puccinia graminis*, producing the destructive stem rust of wheat and of other cereals and grasses. A few species having a wide range of hosts, like *P. subnitens*, appear not to be specialized. The citation of literature includes 174 titles, supplied by 67 writers, indicating the prominence which this line of investigation has attained within the last few years. ERIKSSON'S studies on the specialization of the grain rusts, reported in 1894, introduced the subject, but the fixed and unchanging character of physiological strains has first been shown definitely in the present paper, since being confirmed by STAKMAN and others.[20]

It is pointed out that so far the data do not indicate that bridging species are capable of altering the physiological nature of the parasite so as to enable it to extend the range of its natural hosts, as has heretofore been assumed. In fact, it appears that among fungous parasites there are definite strains or races not distinguishable morphologically, but only by their physiological behavior in infecting certain hosts, and that these strains retain the same characters through all the metamorphoses of the fungus, and when tested by use of any kind of reproductive body that the particular species produces. The specialization of the same fungus in widely separated regions may possibly be different, but the data are scanty. The relation of physiological specialization to morphological variation is barely mentioned. The whole subject of specialization is one of great scientific and economic interest, making the present admirable summary particularly timely.—J. C. ARTHUR.

**Heath and grassland.**—Continuing the investigations already noted[21] of certain English heaths and grassland, FARROW[22] has accumulated more data upon the effects of a rabbit population upon vegetation retrogression. It is demonstrated that the presence of rabbits alone is sufficient at times to change a pine forest through *Calluna* heath and *Carex arenaria* associations to a dwarf grass or a *Cladonia* heath. Experiments with irrigation and with the application of manure tend to show that both sterile soil and lack of soil moisture are factors in limiting the rate of growth and the luxuriance of the vegetation. This increased growth with improved conditions results in a decrease in the number of species in the area, since the more rapid growth of certain plants, like *Agrostis vulgaris*, smothered less vigorous ones, such as *Festuca ovina*.

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[20] STAKMAN, E. C., PARKER, J. H., and PIEMEISEL, F. J., Can biologic forms of stem rust on wheat change rapidly enough to interfere with breeding for rust resistance? Jour. Agric. Res. 14:111–123. *pls. 13–17*. 1918.

[21] BOT. GAZ. **64**:263. 1917.

[22] FARROW, E. P., On the ecology of the vegetation of Breckland. III. General effects of rabbits on the vegetation. IV. Experiments mainly relating to the available water supply. V. Observations relating to competition between plants. Jour. Ecology **5**:1–18, 104–112, 155–172. 1917.